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AGO, d/a ltr 29 Apr 1980

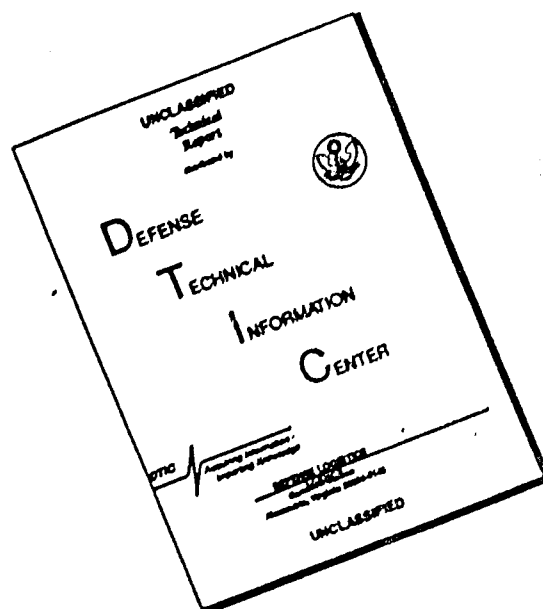
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DEPARTMENT OF THE ARMY  
OFFICE OF THE ADJUTANT GENERAL  
WASHINGTON, D.C. 20310

IN REPLY REFER TO  
AGAM-P (M) (9 Mar 67) FOR OT

14 March 1967

SUBJECT: Operational Report - Lessons Learned, HQ, 168th Engineer Combat Battalion

TO: SEE DISTRIBUTION

1. Forwarded as inclosure is Operational Report - Lessons Learned, Headquarters, 168th Engineer Combat Battalion for quarterly period ending 31 October 1966. Information contained in this report should be reviewed and evaluated by CDC in accordance with paragraph 6f of AR 1-19 and by CONARC in accordance with paragraph 6c and d of AR 1-19. Evaluations and corrective actions should be reported to ACSFOR OT within 90 days of receipt of covering letter.

2. Information contained in this report is provided to the Commandants of the Service Schools to insure appropriate benefits in the future from lessons learned during current operations, and may be adapted for use in developing training material.

BY ORDER OF THE SECRETARY OF THE ARMY:

*Kenneth G. Wickham*

KENNETH G. WICKHAM  
Major General, USA  
The Adjutant General

1 Incl  
a/s

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HEADQUARTERS  
168TH ENGINEER COMBAT BATTALION  
APO 96227

EBL-CO

12 November 1966

SUBJECT: Operational Report-Lessons Learned (RCS CSFOR-65), for  
Quarterly Period Ending 31 October 1966.

THRU: Commanding Officer  
79th Engineer Group  
APO 96491

Commanding General  
18th Engineer Brigade  
APO 96307

Commanding General  
United States Army, Vietnam  
ATTN: AVC-DH  
APO 96307

Commander in Chief  
United States Army, Pacific  
ATTN: GPOF-MH  
APO 96558

TO: Assistant Chief of Staff for Force Development  
Department of the Army (ACSFOR-Da)  
Washington, D.C. 20310

Section 1. Significant Organization or Unit Activities

1. GENERAL. During the period 1 August-31 October 1966, the 168th Engineer Combat Battalion was principally engaged in general engineer support of 1st Infantry Division base camps at Di An, Phuoc Vinh, Phu Loi, and Lai Kho. This support included cantonment construction, repair and maintenance of tactical runways, and construction of helipads and airfield facilities. Other functions

associated with the engineer support effort included operation of laterite pits at each location, participation in periodic armed re-supply convoys from Di An to Lai Khe and Phuoc Vinh, reconnaissance of the Song Be River Bridge along Route 16 near Phuoc Vinh, employment of platoon-sized ambush patrols in areas adjacent to the cantonments, and periodic combat support activities. The battalion operated on a 7day-75 hour week, with Sunday morning devoted to maintenance. Training was limited to orientation of newly assigned personnel, monthly character guidance and weekly command information classes, and continuous on-the-job engineer training.

## 2. COMPANY A

a. At Phu Loi, Company A supported 1st Division Artillery and numerous aviation units assigned or attached to the division. The company, commanded by Capt George W. Davenport, Jr, constructed 64 troop billets, totalling 60,220 square feet; 20 mess halls, totalling 19,400 square feet; and 42 other buildings totalling 43,440 square feet. Included in this construction total were several air-field facilities, such as a 32'x60' maintenance hangar.

b. Continuous effort was expended on repair and maintenance of the surface-treated laterite runway which began to disintegrate under the heavy wheel loads of Army reconnaissance aircraft and periodic USAF C-130 sorties. The repairs involved sweeping large chunks of displaced rock and laterite from the runway, and continuous patching of potholes. While this method was inefficient in the sense that repaired potholes frequently failed again under new loads, it was effective in preventing aircraft accidents. The small manpower and equipment effort required by the operation was a worthwhile stop-gap solution pending resurfacing of the runway. During this period, a penesprine program was also initiated to suppress dust near helipads of the 1st and 11th Aviation Battalions. Equipment used to accomplish the foregoing missions included a grader, crane-shovel, truck mounted asphalt distributor, rotary sweeper, and roller attached from the battalion equipment platoon and 557th Engineer Company (Light Equipment).

c. Until late August, the 1st Platoon of Company A was detached to support the cantonment construction project at Di An. On 12 August, a reinforced squad of the platoon, under the supervision of Lt James Barnes, was assigned a combat support mission involving hand clearing and site preparation at the top of Hill 837 (Coordinates YT 605101), near Xa Gia Ray, in preparation for eventual installation of a signal relay station by 173rd Signal Battalion. The mission was successfully completed without incident by 3 September. Chain saws, machetes, and demolitions were used effectively to accomplish the site preparation.

d. On 15 October, Company A began staging 100th Engineer Company (Float Bridge), and Headquarters and A Companies of the 86th Engineer Combat Battalion. For approximately two weeks, the company assisted these newly arrived units in becoming well established at Phu Loi. The former company area of Company A, 168th Engineer Combat Battalion was transferred to the 86th Engineers, who assumed formal responsibility for projects at Phu Loi on 1 November 1966. At that time the final elements of Company A deployed to Di An to join the other platoons which had preceded them by a week. When they left Phu Loi, the cantonment area was approximately 70% completed.

### 3. COMPANY B

a. At Lai Kho, the base camp of 3rd Brigade, 1st Infantry Division, Company B, minus a platoon which was detached to Di An on 11 August, constructed a total of 97 billets accommodating 15 men each, and 16 other buildings totalling 15,680 square feet of office space, storage, and community facilities. The company, under the command of Lt Dwayne Lee, also used 10,670 gallons of pancrime in the dust suppression program, principally on helipads and associated airfield facilities.

b. Supported by arc welding equipment from 46th Engineer Battalion and 557th Engineer Company (Light Equipment), the company repaired and maintained the MB PSP (pierced-steel-planking) C-130 runway at Lai Kho. During the rainy season, expedient repairs to the MB plank, which had far exceeded its design life, were accomplished by welding reinforcing rod between adjacent planks where connecting lugs of the MB had suffered fatigue failure. Concurrently, crushed rock tailings were spread under the runway planking in a continuing effort to stabilize the laterite subgrade. Although these efforts improved conditions at the Lai Kho Strip somewhat, it was nevertheless closed to C-130 aircraft except in cases of tactical emergency. In retrospect, it appears that a wiser course of action might have been to remove the PSP in 1000 foot sections, (thereby keeping the 3600 foot runway open to CV-2 aircraft throughout) and recompact the subgrade. The marginal results obtained by continuous rewelding of fatigued PSP do not seem to warrant the engineering inefficiency involved in the welding process.

c. Heavy equipment from Headquarters Company's equipment section and 557th Engineer Company (LE), including one 20 ton truck-mounted crane-shovel, two motorized road graders, one trailer mounted 600 gallon asphalt distributor, one 9 wheel roller, and one 16S concrete mixer supported the cantonment construction effort of Company B at Lai Kho for most of the reporting period.

d. At 2330 on 15 August, Lai Kho came under Viet Cong mortar attack. Approximately 14 rounds exploded in the B Company

area, wounding 9 enlisted men. As a result of his heroism in treating the wounded despite his own wounds and in disregard of his own safety, SP4 Richard I. Hoadley, the company medic, was awarded the Bronze Star Medal for Valor.

e. Combat support missions accomplished by Company B included the clearing and evacuation of refugees from the village of Ap Ben Dong So to Bon Cat in support of 3rd Brigade, 1st Infantry Division on 1 August; and subsequent construction of a refugee village at Bon Cat a few days later. During this operation, one HD-16 dozer was lost to a V.C. mine, and one man was wounded in action near the village of Bau Bang. For five days during the end of August and beginning of September, B Company also secured the Lai Khe perimeter with an average of 50 men a day. This mission greatly reduced the engineering effectiveness of the company throughout its duration.

f. During this quarterly period, 3 resupply convoys were run to Lai Khe. On these occasions, 1100 tons of engineer construction materials were hauled from Di An while infantry units swept Route 13 for periods of 2-5 days. On 18 October, Company B began staging Company C of the 86th Engineer Combat Battalion, which subsequently assumed full responsibility for construction missions in the Lai Khe base camp on 20 October. After thoroughly coordinating the transition between units during this overlap, Company B phased down to Di An in three elements on 26, 28, and 29 October to rejoin battalion headquarters. At the time of its departure from Lai Khe, the unit had completed approximately 60% of the cantonment construction required in that base camp.

g. The 38th Engineer Detachment (Well Drilling) arrived in Lai Khe shortly before the quarter began. During the past three months, the unit drilled and cased one 128 foot well, and has reached a depth of approximately 100 feet on a second well. Drilling progress with the military drill rig is very slow, due at least partially to the difficulty of percussion drilling in the soil strata encountered in the area. Judging from observation of civilian rotary rigs operating successfully in this vicinity, it appears that rotary drilling is better adapted to local geological conditions.

#### 4. COMPANY C

a. At Phuoc Vinh, Company C, commanded by CPT Stephen E. Smallwood, continued its support of 1st Brigade, 1st Infantry Division. During the past three months, the company constructed 60 billets (20'x52'); 31 administrative buildings, classrooms, and similar type facilities (20'x48'), and has partially completed a community center complex consisting of a 30'x60' chapel, 40'x100' service club, 20'x48' Red Cross Office, 20'x48' Post Office, and a 50'x100' Post exchange.



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b. Drainage work was limited during this quarter by the heavy monsoon rainfall. The principal efforts in this regard involved cleaning of ditches and culverts, and improvement of drainage in the vicinity of the airfield runway and helipads. Approximately 15,000 linear foot of drainage ditches and 1,300 feet of culvert were constructed.

c. Support equipment, including a grader, 13 wheel roller, and trailer mounted asphalt distributor, was provided by Headquarters Company and 557th Engineer Company (L&E). Utilizing this equipment, 38 helipads were constructed for the 162nd Assault Helicopter Company, and 31,320 gallons of RC-3 were spread to suppress dust and stabilize the helipad area. A control tower was also constructed at the Phuoc Vinh airfield.

d. Two resupply convoys were scheduled between Di An and Phuoc Vinh during this quarter. Approximately 1700 tons of engineer construction materials, including gravel, cement, lumber, and roofing were hauled. During the first convoy (24 August-1 September), vehicle load classification was limited to Class 22, because of the poor condition of the Song Bo Bridge. During the major portion of the second convoy, the overall route classification was further reduced to Class 16 because of extensive damage to a bridge on the Song Dong Nai River south of Tan Uyen. The severe weight limitation remains a major problem insofar as moving construction materials is concerned. On several occasions, critical items were airlifted to Phuoc Vinh by CV-2 to permit construction to continue. Other measures have been effected to reduce the impact of this supply problem. For example, buildings are constructed on "O-Rings" rather than complete floor slabs in order to conserve cement and aggregate. When sufficient materials become available, slabs (either concrete or sand-cement, depending on the availability of coarse aggregate) are poured inside the "O-Rings."

e. During the period that Route 16 was opened for the second convoy of the quarter, Company C and reconnaissance personnel from battalion headquarters gathered data regarding the existing 399 foot bridge over the Song Bo river. This data included measurements of structural members, river bottom profiles, current velocity, and evaluation of the condition of the damaged concrete trusses and the French prefabricated bridge now spanning the blown center span. Results of the reconnaissance were forwarded to higher headquarters along with recommendations for repair and eventual replacement of the bridge.

f. The 917th Engineer Detachment (Well Drilling) was attached to Company C on 31 August. A well was attempted in the vicinity of Phuoc Vinh ice plant, but severe sand infiltration and an impenetrable layer at a depth of 70 feet caused this hole to

be abandoned during October. A second well was begun in a new location just prior to the end of this reporting period. Throughout the quarter, well drilling operations were hampered by the temporary unavailability of acetylene and oxygen for welding the well casing. This shortage again reflects the difficulty of supplying Phuoc Vinh with essential materials because of the limited haul possibilities. The situation should improve somewhat as Route 16 bridges are repaired or replaced.

#### 5. HEADQUARTERS AND HEADQUARTERS COMPANY

a. At Di An, HHC and attached platoons from Company A (until 20 August) and Company B (after 11 August) assumed responsibility for construction in the Main Base Camp area of 1st Infantry Division and the Division Support Command. During the period from 1 August until 15 September, the reinforced company completed 30 billets totalling 30,880 square feet, 25 administration and supply buildings totalling 25,400 square feet, and one 70'x140' prefabricated steel warehouse.

b. Units at Di An conducted ambush patrols numbering approximately 20 men each on each Saturday night throughout the quarter. This arrangement was worked out with the Base Commander so that the battalion could meet its equitable commitment for security of the compound with minimal interference with construction schedules. No casualties were suffered as a result of these patrols, although light contact occurred on several occasions. Headquarters Company also provided security for the details which transported indigenous employees to and from Di An and Thu Duc. On 18 August, SP5 L.A. Mc Mullins, was shot and fatally wounded while on this security detail. Other sniper fire was encountered periodically throughout the quarter but no further injuries resulted.

c. In the middle of September the battalion was assigned the additional mission of constructing a new cantonment area at Di An North for the 2nd Brigade, 1st Infantry Division. The virgin territory selected for the new cantonment area was soon christened as the "North Forty" by the men of Headquarters Company, under Captain Gaylin W. Thomas, and the 2nd Platoon of Company B, under Lt Robert Stonocipher, who undertook the mission. During the last six weeks of the quarter, these units constructed 7900 square yards of natural roads, 9200 linear feet of drainage ditches, 750 linear feet of culvert, 280 latrine holes, 8 shower heads, 9 mess halls, and 8 administration and supply buildings. This significant output was further bolstered by the arrival of Companies A and B (-) at the end of this quarterly reporting period.

d. In order to provide the required equipment support for the "North 40" project, each of the line companies had previously dispatched four 5 ton dump trucks and one dozer on temporary duty to Headquarters Company. Approximately 20 additional 5 ton dump trucks from 617th Engineer Company (Panel Bridge) supported the laterite haul regularly. Two dozers with scrapers, two graders, an antrencher and a front loader from 557th Engineer Company also contributed to the construction effort.

e. The initial clearing of the "North 40" was accomplished by four HD-16 tractors with Rome plow blades attached. These plows, which were at Di An until 2 October, proved most effective in clearing bamboo, light trees, and brush without stripping the topsoil and grass cover excessively. In the course of the clearing operation, several mortar duds and M79 rounds were discovered and blown in place. Also uncovered were three V.C. wells, an underground bamboo-revetted room and tunnel, and some abandoned trenches.

f. "Frenchman's Pit" (XT 968082) was opened as a source of laterite for construction of the roads in the "North 40". The laterite proved to be plentiful and of high quality, but the relatively long and narrow haul road between that location and Di An has been a continuing problem. In an effort to alleviate deteriorating road conditions, the battalion initiated periodic road maintenance, including hauling of blast rock and laterite to fill soft spots and widen the heavily travelled road, and grading of the laterite surfaced portion of the road. Haul road maintenance also required a security detail, since trucks travelling the road were sometimes subjected to sniper fire. On two separate occasions, road work was interrupted briefly by sniper fire. On another occasion, a 5 ton dump truck entering the laterite pit in the morning detonated a mine, blowing off a tandem wheel and damaging the gas tank and body of the truck slightly. Toward the end of October, an infantry platoon from 2nd Brigade was assigned to secure the laterite pit on a 24 hour-a-day basis.

g. On 10 September, the advance party of 27th Engineer Battalion arrived at Di An. These key commanders and staff officers were paired with their counterparts in this battalion, and worked closely with them for a period of approximately two weeks, learning the techniques developed by the 168th during its first year in Vietnam. From 6 October until 1 November Company B, 27th Engineers supported the construction effort in the "North 40" prior to moving to its permanent location. During this time, the unit constructed one mess hall (20'x128'), 10 administration buildings (20'x48'), and poured concrete floor slabs for 4 additional buildings. This effort was mutually beneficial since it increased the "North 40" construction output while concurrently permitting the company to train its inexperienced engineer troops in vertical construction techniques.

h. The battalion staff continued its efforts to support the line companies to the maximum possible extent. S-1 was especially active during the heavy turnover period after the unit's first year in Vietnam. Over 450 men were in or out-processed during the quarter. S-2 accomplished a drainage survey of Di An and the "North 40" in addition to its normal intelligence, security, and reconnaissance functions. S-3 completed design work on standard structures for the cantonment areas, and produced standard bills of materials to permit effective control over material allocation for all projects. S-4 initiated procurement of gravel, sand, and other construction materials which could not be obtained through normal supply channels. The major logistics effort continued to be hauling construction supplies from Saigon and Long Binh to Di An, and from Di An to Lai Khe and Phuoc Vinh when the armed convoys were conducted. The maintenance section was extremely effective in repairing concrete mixers and fork lift trucks which had exceeded normal life expectancy. The maintenance achievements, coupled with a continuing high equipment availability rate, greatly assisted the battalion in its cantonment construction missions. The communications section, medics, and chaplain also continued to provide excellent support to all concerned.

i. The 156th Engineer Detachment (Well Drilling) was attached to Headquarters Company until 27 September. During this time, the unit began a well in Main Base Camp Di An near the proposed ice plant. This partially drilled well was abandoned in the middle of September when a contractor-operated rotary rig arrived at Di An under contract from OICC to complete the well drilling requirements for the base camp.

6. SUMMARY EVALUATION. The August-October quarter was extremely productive and very educational for the 168th Engineer Combat Battalion. It was productive in that the Di An, Phu Loi, Lai Khe, and Phuoc Vinh cantonments began to show visible evidence of the battalion's horizontal and vertical construction efforts. In this regard, outstanding achievements of the line companies were officially recognized during the quarter when Lt Lee of B Company and CPT Smallwood of C Company were awarded Bronze Star Medals for their efficient and effective management of construction at Lai Khe and Phuoc Vinh respectively. The quarter was educational to the battalion in that many construction techniques were improved and perfected, and that new units were phased into Vietnam under our guidance. In the process, we learned that it often pays to take a long hard look at previously established policies and procedures to see if they may have become outmoded by the passing of time. And, finally, the battalion learned the important lesson that heavy personnel turnover at the end of its first year in Vietnam need not prove unsettling and disruptive to the construction effort. In this regard, the battalion undertook the "North 40" project in the midst of the transition period without noticeable loss of effectiveness. The past quarter has been the battalion's most productive yet, and it sets a high standard for the newcomers to attempt to surpass in quarters to come.

## Section 2, Part I, Observations (Lessons Learned)

### 1. PERSONNEL

#### a. Indigenous Employees

ITEM: Management of Vietnamese personnel.

DISCUSSION: This battalion employs over 400 Vietnamese skilled workers (carpenters, masons, mechanics, etc.) on a permanent hire basis; and approximately the same number of unskilled laborers (concrete crews, ditch diggers, culvert assemblers, etc.) on a temporary basis. The permanent employees require security checks, personnel records, and salary payment on a bi-monthly basis. Temporary employees must be paid their wages daily. The employees are a valuable manpower asset, virtually doubling the battalion's effective manpower capability for construction missions. It is essential that an effective Vietnamese personnel management program be established to recruit and retain these workers.

OBSERVATION: It requires a minimum of one officer and two NCO's to supervise the hiring, processing, disposition, paying, and transportation of the local employees between the battalion job sites and the local villages. Further, vehicles (including drivers and shotguns) must be provided to transport the employees, and personnel and pay records must be maintained. Based on the experience of this unit, the administration involved in the local hire program is more than justified by the benefits achieved. Recommend that additional U.S. military spaces be authorized to units hiring substantial numbers of indigenous personnel in order to permit proper management of these employees. At present, units must divert other US personnel (Commo Officer and S-2 and S-4 NCO's in the case of this unit) from their normal duties to perform these vital personnel management functions.

#### b. Personnel Reporting

ITEM: Measurement of personnel effectiveness

DISCUSSION: On a quarterly basis, this unit is required to submit a report on "Capabilities vs Actual Performance of Selected Units (RCS AVE-44)". In this report, capabilities of a typical engineer combat battalion organized under TOE 5-35D are compared with the capabilities and demonstrated performance of this battalion. In computing effectiveness, the average number of personnel actually involved in construction activities is compared with the average assigned strength of the unit.

OBSERVATION: While the aforementioned system provides a reasonable measurement of effectiveness for units which experience a relatively uniform personnel turnover rate, it is misleading when a unit experiences a complete turnover in a short period of time. For example, this battalion rotated approximately 26% of its personnel during the past quarter, at the completion of its first full year in Vietnam. During the quarter, an average of 40 men a day were carried as assigned, but "in transit". These counted against the measured performance of the battalion, in the sense that they were "assigned" but not "effective", and thus the effectiveness of the unit appears lower than in past quarters. Recommend that future reports be designed to compare "present for duty" strength and "effective" strength in order to get a better and more consistent measurement of unit effectiveness.

## 2. OPERATIONS

### a. Road Maintenance

ITEM: Maintenance of haul roads in insecure areas.

DISCUSSION: Roads which endure heavy convoy and haul traffic are in need of frequent repairs and continuous maintenance, especially during the monsoon season. Since road repair work involves men and heavy equipment spending relatively long periods of time along the same stretch of road, security becomes a problem in any area subject to V.C. infiltration.

OBSERVATION: Road maintenance elements of this battalion were generally not fired upon by snipers until they had been working on the same segment of road for a period of 3 or 4 hours. It is recommended that road maintenance be scheduled in such fashion that short stretches are repaired quickly, and the equipment and personnel move on to a new site within a few hours. Continuous linear maintenance or predictable patterns should be avoided in the interest of security.

### b. Runway Repair

ITEM: Repair of surface-treated laterite runways.

DISCUSSION: Laterite runways built by the Japanese or French during the past 25 years have a tendency to break up under the sustained heavy wheel loads of modern USAF aircraft, particularly the C-130. Patching these surface-treated runways is generally a difficult problem since the poor overall conditions of the wearing course and subgrade are not generally susceptible to the square-cut asphalt patching methods recommended by the manuals, and since crushed rock aggregate is often difficult to obtain in isolated locations.

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OBSERVATION: Several methods of patching runways have been attempted by this unit with varying degrees of success. These include:

(1) Squaring off potholes, digging in anchors, pouring concrete patches, and sealing the edges with asphalt. This method was highly effective, but relatively uneconomical in terms of time and materials.

(2) Squaring off potholes (to the extent possible, considering the condition of the adjacent areas), mixing cold patches with RC-3 and 2 inch minus aggregate, compacting with a 10 ton steel wheel roller, and sealing with sand. While this patch itself was reasonably effective, the large aggregate tended to exert lateral pressure rather than keying when rolled. This caused heaving and cracking in adjacent surfaces, and negated the value of the patch.

(3) Squaring off potholes, filling with laterite, compacting with a roller, and sealing the patch with RC-3. It was discovered that this type of patch fails quickly under aircraft wheel loads unless it has a great deal of time to set up.

(4) Squaring off potholes, mixing cold patches using 1"-1/2" aggregate and small amounts of RC-3, compacting, and sealing with sand. When adequate control was exercised over washing the aggregate, this type of patch proved very satisfactory. This is the best patching method, provided that suitable aggregate can be obtained.

#### c. Vertical construction

ITEM: Building prefabrication.

DISCUSSION: Most vertical construction accomplished by this battalion is based on standard plans involving 20 foot building widths and any lengths in multiples of 4 feet. This standardization lends itself to prefabrication of rafters, louvered gable ends, end panels, and side panels of identical design.

OBSERVATION: A central carpenter shop utilizing skill-saws, jigs, and highly skilled Vietnamese carpenters can produce standard prefabricated sections quickly enough to keep an entire company supplied. Prefabrication also reduces the need for skilled carpenters at the erection site, since the relatively sophisticated components are already completed.

#### d. Drainage

ITEM: Drainage around buildings.

DISCUSSION: During the monsoon season, runoff from the roofs of large prefabricated buildings (70'x140', etc.) can become a significant drainage problem.

OBSERVATION: Half-sections of small (12" or 18") culvert can be dug in to ground level around the perimeter of a large building to catch the roof run off and channel it to nearby ditches. This prevents washing out around the building and possible flooding of the building interior.

#### e. Culverts

ITEM: Culvert protection during the monsoon season.

DISCUSSION: Placing culverts in Vietnam during the monsoon season poses a difficult problem regarding proper compaction of the wet laterite culvert bed. While the use of rock assists in providing a good bed, rock is not always available at the isolated locations where culverts must be installed.

OBSERVATION: It has been found that two layers of pierced steel planking placed in an "X" pattern over the top of a newly emplaced culvert help distribute wheel loads of vehicles passing over a newly compacted wet laterite backfill. This temporary expedient permits the laterite to consolidate and dry out without displacing excessively and without damage to the culvert.

#### f. Concrete

ITEM: Concrete batching operations.

DISCUSSION: Normal concrete operations involved in cantonment construction require the movement of mixers and materials to and from widely separated pouring sites. This causes loss of productive time, waste of materials, and excessive equipment wear, especially during the monsoon season when ground conditions are muddy.

OBSERVATION: A concrete batch plant eliminates the aforementioned problems and increases the quantity of concrete which can be poured in a given time frame. Using a 16S mixer, two 5 ton dump trucks to haul aggregate and concrete, and two engineer squads to charge the mixer, a batch plant can be operated effectively enough to meet a company's pouring needs.

#### g. Work Parties

ITEM: Vertical construction work parties.

DISCUSSION: There are certain basic tasks inherent in vertical construction of prefabricated tropical wood buildings. These include:



- (1) Erection of prefab wall sections and installation of bracing.
- (2) Erection of rafters and purlins.
- (3) Erection of screening and siding.
- (4) Erection of roofing and knee bracing.

OBSERVATION: Construction efficiency can be promoted by specialization in the basic tasks performed. It has been found that the tasks listed above can be accomplished most effectively by work parties of 3,5,4, and 3 men respectively. By forming such specialized work parties, work is always in progress on four buildings. With the greater efficiency achieved by specialization, vertical construction of a 20'x52' building can be completed in a period of 1 1/2 days. Further, the quality of construction is usually better than that achieved by personnel working at a variety of tasks.

#### h. Construction planning

ITEM: Job layout and planning.

DISCUSSION: To promote efficiency in construction of billet areas, a small amount of prior planning and layout work can expedite construction progress greatly.

OBSERVATION: Critical areas which involve advanced planning include:

- (1) Coordination of the removal of existing tents or unauthorized facilities at the proposed site.
- (2) Staking of building pads in advance so that laterite can be economically positioned at an early stage for eventual pad construction.
- (3) Placing and compaction of at least three laterite pads in any new area should be completed before the forming crews arrive at the site. This permits smooth and steady progression through the construction cycle.

#### i. Latrines

ITEM: Rapid construction of latrines.

DISCUSSION: When a brigade or larger sized unit deploys to a new permanent location on short notice, latrines and similar sanitary facilities must be provided quickly and in large quantities.

OBSERVATION: Construction time for latrines can be reduced significantly by prefabricating and assembling standard-sized latrines in a central location and letting the using units pick them up.

It was found that construction time can be further reduced by siding the latrines to a height of 4 feet with tin roofing (which greatly reduces the requirement for construction of time-consuming louvers), and by installing locally purchased toilet seats over square-cut holes (thereby eliminating time consuming circular cuts).

j. Wells

ITEM: Well casing.

DISCUSSION: Casing available to the well drilling detachments attached to this battalion requires constant welding of ten foot sections as they are emplaced.

OBSERVATION: The shortage of welding equipment in Vietnam causes considerable delay in placing well casing. Use of threaded male-female casing would eliminate these delays and would probably also alleviate the casing alignment problem which occurs from uneven welding.

k. Convoys

ITEM: Engineer participation in resupply convoys.

DISCUSSION: Engineer march units in resupply convoys conducted periodically to isolated base camps are generally the heaviest and slowest elements of the convoys. Heavy equipment, such as 20 ton mobile cranes and fully loaded lowbeds cannot maintain the speeds frequently desired by convoy commanders, especially when the convoy comes under attack.

OBSERVATION: For the reasons mentioned above, engineer equipment is frequently placed in one of the last march units. On occasions, forward elements have speeded up to a degree that the engineer march unit was left far behind. To prevent this situation, it is recommended that engineer heavy equipment be placed at the head of the march column to insure that convoy integrity is maintained.

l. Unit Movements

ITEM: Relocation of engineer units.

DISCUSSION: Engineer units which are engaged in construction at a specific cantonment area for a considerable period of time generally hire local employees, open laterite pits, and establish construction procedures and techniques such as prefabrication, concrete batching, "O-Ring" pouring, etc. which are best adapted to the local environment and resources. Upon relocation, the unit finds itself in an unfamiliar environment without the employees, resources, and construction procedures which it had previously used.

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OBSERVATION: Units which are relocated from one cantonment area to another suffer a loss of efficiency for a period of about one month. During this time, a reorientation of thinking and reorganization of the working force is generally necessary. This situation has been observed on several occasions in this battalion when platoon and company-sized moves occurred.

### 3. TRAINING

ITEM: Motivation for off duty training.

DISCUSSION: The 75 hour work week required of all personnel in this battalion leaves little time for any training other than the initial orientation for replacements, monthly character guidance, weekly command information classes, and periodic weapons firing. However, refresher training in combat subjects is vitally necessary, since the unit is principally engaged in construction work on a day-to-day basis, but must maintain its capability for normal tactical support missions expected of combat engineers.

OBSERVATION: Training films, which are shown each evening prior to the nightly movie in the battalion classroom, attract considerable troop participation on a voluntary basis. Programming this training just prior to entertainment seems to insure a receptive audience, and helps keep the troops refreshed in basic combat training subjects. However, it is recommended that units which are primarily engaged in cantonment construction for a long period of time be given a period of intensive combat engineer training prior to their employment in a major tactical support role.

### 4. LOGISTICS

#### a. Materials transfer

ITEM: Transfer of Project Materials from 168th Engineer Battalion to the 86th Engineer Battalion.

DISCUSSION: This Battalion was directed to turn over all projects at two locations, Phu Loi and Lai Khe, Vietnam, to a newly arrived Engineer Battalion. After co-ordination with the depot, it was decided that we would cancel all materials due-out to these locations, and that the new unit would rerequisition these materials. Since all requisitions and cancellations had to be approved by Group, the amount of paper work and time involved was excessive.

OBSERVATION: A simple solution to the problem might have been as follows:

(1) Fast-moving materials, (materials which are readily available and are released quickly after being requisitioned) such as lumber, cement, roofing, screen, etc., can be issued directly from the S-4 yard of the battalion or from the PA&E yard on the old unit's account to be picked up by personnel and transportation provided by the new unit.

(2) Slow moving items such as pumps, tanks and most electrical supplies should be cancelled by the old unit and re-requisitioned by the new unit, as was done for all items during this turnover.

#### b. Airlift

ITEM: Shipment of construction materials by air.

DISCUSSION: Due to a delay in the scheduling of supply convoy to an outlying company at Phuoc Vinh, it was necessary to supply that base camp by air with critical construction materials such as lumber, cement and peneprime. The type of aircraft usually available was the CV-2, and these became available at very short notice. On one occasion a CH-47 Chinook was provided to airlift peneprime.

OBSERVATION: Loading fixed wing cargo aircraft with construction materials is a difficult task. Due to short notice on the availability of the aircraft, plans for the day were usually disrupted since the only fork-lift available to the battalion was tied up at the airfield for a considerable period of time. This difficulty was eventually overcome by loading materials on plywood sheets mounted on 4"x4" timbers in the bed of a 2 1/2 ton pole-type trailer in the S-4. The trailer could then be moved to the airfield by 3/4 ton truck, and unloaded directly into the CV-2 by three men using two sets of standard rollers from the trailer to the rear of the plane. The best means of transporting construction materials by air was found to be Chinook helicopter. It was faster than the CV-2, considering loading and unloading time as well as flight time, and more could be carried per load. The best way for the CH-47 to handle bulky materials has been by sling or cargo net.

#### c. Maintenance

ITEM: Dump truck frames.

DISCUSSION: It has been discovered that seven out of thirty-nine 5 ton dump trucks, M51A2, in this battalion had a crack in the inner frame reinforcement at the front bracket mounting hole on the right side. This cracking seems to have occurred at an average mileage between 7000-9000 miles.

OBSERVATION: An EIR was submitted by this headquarters early in the quarter. A reply received from the Commanding General, US Army Tank and Automotive Command, on 31 October advised that the condition may be caused by overloading, but that an evaluation study for redesign has been initiated with a view toward testing and developing an improved frame during FY 67, if required. In the interim, trucks with cracked secondary members will be repaired by welding. Those with cracked main members will be rewelded and reinforced with fishplates.

### Section 2, Part II, Recommendations

1. The construction and combat support missions assigned to this battalion during the August-October quarter varied from previously assigned missions only in scope or location, but not in the fundamental nature of tasks to be performed. The improvements effected during this period have largely been covered in the "Lessons Learned" portion of this report, as have minor recommendations regarding construction techniques and job management. In this section of the report, recommendations regarding three major observations of the past quarter will be presented.

2. The first major recommendation concerns reorganization of TOE 5-35D Engineer Combat Battalions under the new TOE 5-35E. The novel demand for relatively sophisticated cantonment construction in the Vietnam theater of operations occupies a majority of this battalion's engineering effort. The requirements for loading and hauling bulk materials (laterite, gravel, sand, etc.) exceed the loading capabilities of this unit and its available light equipment backup. TOE 5-35E would provide 2 additional front loaders per line company. The new TOE would also increase the maintenance capability of the battalion by providing more mechanics and a contact maintenance truck well adapted to the unit's widely scattered jobsites. It would provide a rough terrain crane and an extra grader, both of which could be profitably used in construction work. Further, it would provide one additional line company to absorb the existing construction overload. The Combat Construction Section augmentation to TOE 5-35E is also recommended for all units engaged in cantonment construction work. The engineering officer of that section would be invaluable in accomplishing design work, and the utilities specialists are vitally needed to complete cantonment construction to the required standards. For example, this battalion is charged with responsibility for installing electric lights, fans, and wiring in all buildings constructed under the MCA (Military Construction, Army) program, but it does not have any qualified electricians to accomplish the work. At present, it is necessary to train combat construction specialists and combat demolitions specialists to perform these functions. While such stopgap solutions have somehow managed to keep

utilities installation moving at a reduced rate, they should not be regarded as acceptable long term solutions to the problem. If sophisticated utilities are to be installed by combat engineer battalions, then these battalions should be provided the wherewithall to accomplish the mission effectively. TOE 5-35E, with its Construction Support Section, appears to provide the required equipment and skilled personnel. It is understood that 18th Engineer Brigade has recently submitted an MTOE to change all combat battalions from D Series to E Series TOE. Recommend that this request be approved promptly, and that the Construction Support Section be augmented to the basic TOE 5-35E for units engaged in cantonment construction.

3. A second category of recommendations concerns the staging of engineer battalions newly arrived in Vietnam. During the past two months, this headquarters staged two engineer battalions and one separate company. Prior to the arrival of the first advance party on 10 September, a concept was developed whereby the principal staff officers would present general briefings to the entire advance party, covering the missions, organization, and functions of their sections and relating some of the peculiarities of engineer operations in Vietnam as opposed to elsewhere. The newly arrived officers were then paired off with their counterparts in the battalion, and they spent approximately one week reading themselves into the local environment under the guidance of their counterparts. Generally speaking, this involved visiting higher and adjacent headquarters with whom the staff would have future dealings, and on-the-job experience with personnel, operations, and logistical procedures unique to Vietnam. During succeeding weeks, the company commanders lived with line companies of the battalion to observe construction operations in progress. Staff members visited the outlying units, and began to operate on behalf of their own battalion in such matters as recruiting indigenous laborers, opening supply accounts, and adapting out standard designs to meet their needs and desires. A similar process was followed with the other units which were staged. Generally speaking, the arrangement proved satisfactory from this unit's viewpoint. There were, however, various problems which arose with one or another of the new units. Judging from the overall experience of all staged units, more guidance should be provided to deploying units regarding equipment and supplies which should be: (a) Carried with the unit, (b) Sent Red TAT, (c) Sent general cargo. For example, the personnel of one unit arrived without sleeping gear, expecting either to draw cots and mattresses upon arrival, or to pick up their Red TAT immediately. The ship carrying the Red TAT was delayed, and a consequent scramble for all available cots in the Di An-Long Binh-Bien Hoa vicinity ensued. Recommend that all units deploying to Vietnam be advised to come equipped with air mattresses and shelter halves for living on their own for at least a week until their Red TAT arrives. While it is often possible for the staging unit to obtain tents, it is extremely difficult to obtain such short-supply items as cots and

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mattresses. In an even more serious miscalculation, another unit arrived at Vung Tau without ammunition, an absolute necessity for any unit entering the combat zone. A final point which should be stressed to all deploying units is the importance of knowing what specific items are on each inbound ship transporting the unit's supplies and equipment. Considerable difficulty in unloading at the port resulted from one unit's inability to state what was on the inbound vessel. In summary, it is recommended that more planning guidance and technical assistance be provided to units designated for deployment to Vietnam. It is further recommended that the advance party be composed of the Battalion Commander, S-1 or Personnel Officer, S-3, S-4, maintenance officer, and the line company commanders. Only through the early and complete orientation of these key personnel can a battalion hope to achieve operational readiness immediately upon arrival in Vietnam.

4. A final recommendation concerns the problems of units which are relocated, either from their proposed location immediately upon arrival in country, or from another base in Vietnam as the result of changing troop deployments. First, it was observed that incoming units were frequently diverted from one proposed location to another, literally within a matter of days prior to the arrival of the main body. This virtually precludes any significant degree of planning for physical layout of the unit area within an existing base camp; or for advanced set up of a base camp, hiring of local employees, and other arrangements necessary for the smooth functioning of a newly arrived unit. Similar difficulties arise when units within Vietnam are scheduled for redeployment to locations which remain undecided until the last few days before movement. During this quarter, for example, the proposed locations of two incoming battalions directly affected the relocation of two companies of this battalion. When the incoming units were rearranged geographically, our companies followed suit. In the end, arrangements for living space and working areas were completed just prior to the arrival of the companies, leaving no time for movement of boundary fences or preparation of hardstands for their equipment. It is strongly recommended that unit deployments be programmed on a long term basis to permit the affected units to plan for the move. At company level, a month is adequate notice for a permanent move. At battalion level, it is recommended that at least six weeks notice be provided. Without adequate time for prior relocation planning, lost time and a certain amount of confusion must be expected of any moving unit.

*Edwin F. Pelosky*  
EDWIN F. PELOSKY  
LTC, CE  
Commanding

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EGE-3 (12 Nov 66) 1st Ind  
SUBJECT: Operational Report - Lessons Learned (RCS CSFOR-65), for Quarterly  
Period Ending 31 October 1966

HEADQUARTERS, 79th Engineer Group, APO 96491, 20 November 1966

THRU: Commanding General, 18th Engineer Brigade, APO 96307

TO: Assistant Chief of Staff for Force Development, Department of the Army  
(ACSFOR-DA), Washington, D.C. 20310

1. The quarterly operational report of lessons learned for the 168th Engineer Battalion is forwarded.

2. The following comments and recommendations are submitted for your consideration:

a. Well Casing. This headquarters recognizes the advantages of using standard threaded wellcasing and recommends its introduction into the supply system. The group has recently assigned an NCO to provide technical assistance to the well drilling detachments. Several of the problems inherent in the welding of casing are under study and procedures are being developed to increase the efficiency of the welding procedure.

b. Reorganization of Combat Battalions. This headquarters is on record as favoring the reorganization of the combat battalions under the E-series TOE. It is strongly recommended that the combat construction section augmentation be authorized. This augmentation would provide the basic construction skills desperately needed by the units engaged in cantonment construction.

c. Guidance for Incoming Units. The comments and recommendations of the battalion commander based upon his experience in the sponsorship and staging of several units are well taken. Future letters of guidance to incoming units will incorporate the suggestions and recommendations made. It is recommended that these suggestions be incorporated in the guidance given by CONARC to units preparing for deployment, with special emphasis given to the usual delay in the receipt of red-circle TAT cargo.

d. Unit Relocation. It is recognized by this headquarters that the advance notification criteria (one month for companies, six weeks for battalions) for the relocation of units are desirable. However it must be pointed out that tactical considerations often preclude such lead time.

  
WALTER C. GELINI  
LTC CE  
Commanding

Copies furnished  
ACSFOR DA (Direct)  
CO, 168th Engr Bn

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AVHGC-DH (12 Nov 66) 3d Ind  
SUBJECT: Operational Report-Lessons Learned for the period ending  
31 October 1966 (RCS CSFOR-65)

HEADQUARTERS, UNITED STATES ARMY VIETNAM, APO San Francisco 96307 22 JAN 1967

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-OT  
APO 96558


1. This headquarters has reviewed the Operational Report-Lessons Learned for the period ending 31 October 1966 from Headquarters, 168th Engineer Combat Battalion as indorsed.

2. Pertinent comments are as follows:

a. Reference Paragraph 4a, Part I, Section 2; and Paragraph 2e, 2d Indorsement: Concur with unit and indorsing headquarters for reasons stated.

b. Reference Paragraph 2, Part II, Section 2, Page 17; and Paragraph 2b, 2d Indorsement: MTOF 5-36E and 5-37E reorganizing the 168th Engineer Battalion from the D to the E series TOF were submitted to USARPAC on 6 October 1966. USARPAC forwarded same to DA on 19 December 1966.

FOR THE COMMANDER:

  
R. J. THORNTON III  
1st Lt, AGC  
Asst Adjutant General

GPOP-OT (12 Nov 66)

4th Int

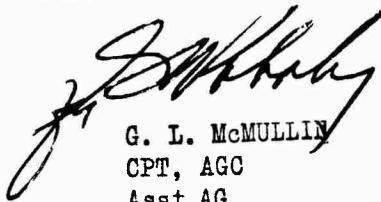
SUBJECT: Operational Report-Lessons Learned for the Period Ending  
31 October 1966 (RCS CSFOR-65) 168th Engr Cbt Bn

HQ, US ARMY, PACIFIC, APO San Francisco 96558 1 MAR 1967

TO: Assistant Chief of Staff for Force Development, Department of the  
Army, Washington, D. C. 20310

This headquarters concurs with basic report and 1st and 3d  
indorsements. The 2d indorsement was not received at this headquarters.  
USARV has been requested to forward additional copy of 2d indorsement.

FOR THE COMMANDER IN CHIEF:



G. L. McMULLIN  
CPT, AGC  
Asst AG